

REMARKS

Claims 1-4, 6-10, 12, 14-18, 20-24 and 26 are pending. Reconsideration of the application in light of the above amendments and the following remarks is respectfully requested.

I. REJECTION OF CLAIMS 1-2, 7-8, 15-16 AND 21-22 UNDER 35 U.S.C.

§ 103(a)

Claims 1-2, 7-8, 15-16 and 21-22 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 5,155,658 (Inman et al.). Withdrawal of the rejection is respectfully requested for at least the following reasons.

i. Contrary to the assertion in the Office Action, the range recited in claims 1 and 15 is not obvious over Inman et al. because the claimed range does not involve routine skill in the art.

Claim 1 is directed to a semiconductor device comprising a ferroelectric capacitor having a ferroelectric material. The ferroelectric material comprises unit cells individually comprising an elongated dimension, wherein a percentage of the unit cells are oriented with the elongated dimensions substantially normal to a generally planar upper surface of the semiconductor body, *and wherein the percentage of cells oriented in that manner is about 50% or more and about 70% or less*. The Office Action concedes that the cited reference (Inman et al.) does not teach a ferroelectric material comprising unit cells with elongated dimensions oriented as claimed in percentages of between about 50% and 70%. However, the Office Action asserts that the claim limitation is obvious in view of the cited art because it would have been obvious to meet the recited working ranges. Applicant concedes that in some limited circumstances it is not inventive to recite optimum or working ranges, however, the MPEP unambiguously states that when a particular range is critical, a *prima facie* case of obviousness is rebutted. MPEP §2144.05 (III) (*citing In re Woodruff*, 919 F.2d 1575 (Fed. Cir. 1990)).

It is respectfully submitted that the recited range in the above claim is critical and nonobvious over the cited art. ***As set forth in applicants' specification, for example, on page 8, line 26 – page 9, line 11, the inventors of the present invention discovered and appreciated that a trade-off exists in ferroelectric capacitor performance.*** For example, while an increased volume orientation improves data retention and switched polarization, ***at substantially high levels of volume orientation it was discovered that after programming, the capacitor tends to relax to a lower polarization level. Consequently, the inventors of the present invention discovered that ferroelectric material with volume orientation approaching 100% undesirably leads to large relaxation levels, thereby negatively impacting sense margin.***

Further, the inventors of the present invention found that ***at an intermediate range of volume orientation (e.g., 50% to 70%, as claimed), the advantages of improved data retention and switched polarization are obtained without a significant degradation in polarization relaxation.*** (See, e.g., applicants' specification, page 9, lines 12-30 and Fig. 5D). ***Thus the use of an intermediate range of volume orientation as claimed achieves unexpected results by reducing polarization relaxation.*** Therefore contrary to the assertions in the Office Action, the range recited in the present invention is not a mere design choice, but rather is a function of the inventors' discovery. Therefore due to the unexpected results provided by the claimed range of the present invention, applicants rebut the *prima facie* case of obviousness asserted in the Office Action. Thus the claims at issue are nonobvious over Inman et al., and withdrawal of the rejection is respectfully requested.

ii. A prima facie case of obviousness is further rebutted in the present case because the cited art teaches away from the claimed invention.

The Federal Circuit has held that a *prima facie* case of obviousness may be rebutted by a showing that the art, *in any material respect*, teaches away from the

claimed invention. *In re Geisler*, 116 F.3d 1465, 1471 (Fed. Cir. 1997) (Emphasis added), MPEP § 2144.05 (III). It is respectfully submitted that not only does Inman et al. not teach the range in question (about 50% to about 70%), but ***one of ordinary skill in the art would not have been motivated to experiment with differing ranges (as asserted in the Office Action), because such variations were discouraged by the cited art.*** More particularly, Inman et al. encourage a ***maximization*** of the c-axis orientation. For example, in Col. 4, lines 21-23 of Inman et al., it states: “[f]or a good ferroelectric memory, the c-axis orientation should be increased to above 80% and preferably about 90%.”) ***Thus one of ordinary skill in the art would not be motivated to reduce the c-axis orientation to an intermediate range as claimed, but rather would attempt to maximize the c-axis orientation based upon the teaching of Inman et al.*** For at least this additional reason, claims 1-2 and 7-8 are nonobvious over Inman et al. Accordingly, withdrawal of the rejection is respectfully requested.

II. REJECTION OF CLAIMS 3-4, 9-10, 12, 14, 17-18, 20, 23-24 AND 26 UNDER 35 U.S.C. § 103(a)

Claims 3-4, 9-10, 12, 14, 17-18, 20, 23-24 and 26 were rejected under 35 U.S.C. § 103(a) as being unpatentable over Inman et al. in view of published U.S. Application No. 2004/0173826 (Natori) or JP 2003-133604 (Sumi). Withdrawal of the rejection of the remaining claims is respectfully requested for at least the following reasons.

The above claims depend on either claims 1 or 15, respectively. As stated above, Inman et al. do not teach or suggest the claimed invention, and neither Natori nor Sumi remedy the deficiencies in the primary reference. Therefore the above claims are also nonobvious over the cited art for at least the same reasons. Accordingly, withdrawal of the rejection is respectfully requested.

III. CONCLUSION

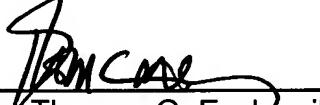
For at least the above reasons, the claims currently under consideration are believed to be in condition for allowance.

Should the Examiner feel that a telephone interview would be helpful to facilitate favorable prosecution of the above-identified application, the Examiner is invited to contact the undersigned at the telephone number provided below.

Should any fees be due as a result of the filing of this response, the Commissioner is hereby authorized to charge the Deposit Account Number 20-0668, TIP346US.

Respectfully submitted,
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CERTIFICATE OF MAILING (37 CFR 1.8a)

I hereby certify that this paper (along with any paper referred to as being attached or enclosed) is being deposited with the United States Postal Service on the date shown below with sufficient postage as first class mail in an envelope addressed to: Mail Stop AF, Assistant Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Date: August 30, 2005



Christine Gillroy